

Effects of global geodynamics in a series of astrometry observations of latitude at Poltava

KHALYAVINA, Lydmila¹ ; BARKIN, Yury^{2*}
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¹Gravimetry Observatory, Poltava, Ukraine, ²Sternberg Astronomical Institute, Moscow, Russia

¹Gravimetry Observatory, Poltava, Ukraine, ²Sternberg Astronomical Institute, Moscow, Russia

Diverse geodynamic phenomena observed in the modern era, received a convincing explanation in the framework of the northern drift of Earth's core. Model proposed and developed by Yuri Barkin relative to the set of ancient geodynamic processes: the secular drift of the Earth's pole, non-tidal acceleration of the Earth's rotation, secular change of gravity, the evolution of the earth's figure, plate tectonics, the formation of specific geological structures, etc.

The North drift of the core generates mass redistribution of the Earth and leads to changes in the gravitational field. Since astrometry instruments have as a reference axis direction of the local plumb line, then this process should be displayed in the slow position changes no polar zenith Observatory. It is shown that for locations in the northern hemisphere, the north drift of the core causes the displacement of local plumb in a southerly direction. Is the picture of long-term changes in the direction of gravity (NST) in the meridian of Poltava for the period 1962 - 2013 based on long-term observations of latitude prismatic astrolabe taking into account: 1) high-precision catalogs (HIPPARCOS, ARIHIP, Tycho-2), 2) improved model of the pole C01 IERS; 3) the theory of the precession-nutation IAU2000; 4) plate tectonics (NUVEL1A-NNR). The resulting long-period changes in NST can be represented as the sum of three components: a linear trend with velocity $\sim -0.0003''$ /yr, the nonlinear part of the trend, consisting of two branches (descending - in 1962 to 1996. And rising - in 1998 and 2010.), which can be regarded as a fragment of a wave with period $T \sim 50$ years and amplitude $A \sim 0.02''$; quasi cyclic part with 11 - year period, close to the main period of index of solar activity period and amplitude $< 0.01''$.

The linear part of the translational displacement means the plumb line to the south of Poltava, which is consistent with the above Barkin's model. The observed velocity of motion of zenith corresponds to moving the center of mass of the Earth in a northerly direction at the velocity in 1.4 cm/yr. Found that the nonlinear part of the trend and the 11-year cyclicity in the shifts of plummet quite clearly reproduce the form of low-frequency polar latitude variations at Poltava derived from model C01 (EOP IERS). Actually observed amplitude of long-period oscillations of latitude caused by pole motion, in 2 times higher than the calculated amplitude. The non-linear part of the trend is the projection on the Poltava meridian of the Markowitz wave.

It is shown that both low-frequency cycles are negatively correlated with the corresponding components of the index of solar activity. The most probable mechanism of solar activity influence on the motion of the pole is the North Atlantic Oscillation. An increase in the amplitude of low-frequency polar displacements of Poltava zenith in astrometric observations requires a special study. One from possible explanations - the influence of the features of the geological structure in the vicinity of Poltava, which is located in the center of the so-called rift Poltava site.

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